APPENDIX
to
Utility Patent Application
for
Light-Activated Adhesive Composite, System, and Method of Use Thereof
(12391-0025)

Data Tables

Chromophore	Concentrations Investigated				
ICG	0.001 mg/mL	0.0025 mg/mL	0.005 mg/mL	0.0075 mg/mL	0.01 mg/mL
MB	0.001 mg/mL	0.0025 mg/mL	0.005 mg/mL	0.0075 mg/mL	0.01 mg/mL
RFC #40	0.5 µL per 13 mL	1 µL per 13 mL	5 µL per 13 mL	10 µL per 13 mL	20 µL per 13 mL
BFC #1	0.5 µL per 13 mL	1 µL per 13 mL	5 µL per 13 mL	10 µL per 13 mL	20 µL per 13 mL
GFC #5 & #1	0.5 µL per 13 mL	1 µL per 13 mL	5 µL per 13 mL	10 µL per 13 mL	20 µL per 13 mL

Table 1: Chromophore concentrations tested in deionized water using cuvettes with a path length of 10mm.

Chromophore	Concentrations Investigated				
ICG	0.1 mg/mL	0.25 mg/mL	0.5 mg/mL	0.75 mg/mL	1.0 mg/mL
MB	0.1 mg/mL	0.25 mg/mL	0.5 mg/mL	0.75 mg/mL	1.0 mg/mL
RFC #40	200 µL per 13 mL	400 µL per 13 mL	600 µL per 13 mL	800 µL per 13 mL	1000 µL per 13 mL
BFC #1	200 µL per 13 mL	400 µL per 13 mL	600 µL per 13 mL	800 µL per 13 mL	1000 µL per 13 mL
GFC #5 & #1	200 µL per 13 mL	400 µL per 13 mL	600 µL per 13 mL	800 µL per 13 mL	1000 µL per 13 mL

Table 2: Chromophore concentrations tested in deionized water using cuvettes with a path length of 0.15 mm.

Chromophore	Concentrations Investigated				
ICG	0.1 mg/mL	0.25 mg/mL	0.5 mg/mL	0.75 mg/mL	1.0 mg/mL
MB	0.1 mg/mL	0.25 mg/mL	0.5 mg/mL	0.75 mg/mL	1.0 mg/mL
RFC #40	200 µL per 13 mL	400 µL per 13 mL	600 µL per 13 mL	800 µL per 13 mL	1000 µL per 13 mL
BFC #1	200 µL per 13 mL	400 µL per 13 mL	600 µL per 13 mL	800 µL per 13 mL	1000 µL per 13 mL
GFC #5 & #1	200 µL per 13 mL	400 µLper 13 mL	600 µL per 13 mL	800 µL per 13 mL	1000 µL per 13 mL

Table 3: Chromophore concentrations tested in albumin solder with a path length of 0.8mm.

	ICG						MB					
	60 °C		80 °C		100 °C		60 °C		80 °C		100 °C	
Time (sec)	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
0	1.852	0.0400	1.852	0.0400	1.852	0.0400	2.237	0.0461	2.237	0.0461	2.237	0.0461
30	1.759	0.0941	1.707	0.0651	1.693	0.0487	2.120	0.0367	2.155	0.0215	2.238	0.0135
60	1.742	0.0813	1.652	0.0435	1.575	0.0956	2.144	0.0248	2.173	0.0353	2.234	0.0244
90	1.630	0.1504	1.670	0.0996	1.577	0.0561	2.049	0.0768	2.126	0.0991	2.204	0.0458
120	1.631	0.0786	1.742	0.0466	1.598	0.0631	2.095	0.0403	2.167	0.0920	2.184	0.0681
180	1.596	0.0376	1.712	0.0612	1.701	0.0576	2.180	0.0340	2.058	0.0948	2.134	0.0429
240	1.558	0.1002	1.735	0.0322	1.450	0.0771	2.147	0.0508	2.219	0.0156	2.170	0.0828
300	1.763	0.0355	1.714	0.0512	1.335	0.0851	2.145	0.0860	2.233	0.0366	2.188	0.0475

Table 4: Absorbance at peak wavelength recorded when deionized water solutions containing ICG and MB were heated to temperatures of 60, 80, or 100°C for various periods of time.

Table 5A - Temperature of 60 °C

	RFC (500 nm)		BFC (630 nm)		GFC (417 nm)		GFC (630 nm)	
Time (sec)	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
0	4.341	0.01452	3.218	0.01452	2.082	0.06441	1.908	0.06309
60	4.262	0.04338	3.048	0.04338	2.070	0.07668	1.901	0.07236
180	4.185	0.03987	3.134	0.03987	2.070	0.03785	1.909	0.03550
300	4.255	0.01538	3.172	0.01538	2.109	0.00966	1.942	0.01131

Table 5B - Temperature of 100 °C

	RFC (500 nm)		BFC (630 nm)		GFC (417 nm)		GFC (630 nm)	
Time (sec)	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
0	4.341	0.03215	3.218	0.01452	2.082	0.06441	1.908	0.06309
60	4.320	0.02892	3.012	0.04338	2.014	0.08734	1.842	0.08739
180	4.132	0.08413	3.139	0.03987	2.051	0.04554	1.877	0.05066
300	4.252	0.07630	3.113	0.01538	2.080	0.02587	1.911	0.02584

Tables 5A and 5B: Absorbance at peak wavelength recorded when deionized water solutions containing red, blue and green food coloring were heated to temperatures of 60 °C (Table 7A) or 100 °C (Table 7B) for various periods of time.

Table 6A - Experimental

	Day 0		1 week		2 weeks		4 weeks		8 weeks		12 weeks	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
ICG (780nm)	2.268	0.0615	0.3020	0.0201	0.2752	0.0239	0.2641	0.0198	0.2788	0.0080	0.1486	0.0471
MB (665 nm)	2.337	0.0166	1.722	0.0285	1.184	0.0110	0.3866	0.0216	0.2517	0.0105	0.1395	0.0619
RFC (500nm)	4.338	0.0338	4.413	0.0841	4.382	0.0741	4.413	0.0292	4.411	0.0579	4.209	0.0479
BFC (630nm)	3.650	0.0215	3.624	0.0201	3.579	0.0723	3.592	0.0473	3.649	0.0186	3.557	0.0354
GFC (417nm)	2.064	0.0527			2.068	0.0075			2.012	0.0268	1.978	0.0503
GFC (630nm)	1.758	0.0510			1.766	0.0060			1.698	0.0260	1.673	0.0492

Table 6B - Control

	Day 0		1 week		2 weeks		4 weeks		8 weeks		12 weeks	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
ICG (780nm)	2.033	0.0731	0.7964	0.0375	0.5252	0.0692	0.2937	0.0745	0.2104	0.0420	n/p	
MB (665 nm)	2.079	0.0386	2.117	0.0106	2.043	0.0674	1.994	0.0564	1.982	0.0246	2.043	0.0102
RFC (500nm)	5.756	0.2767	5.754	0.2098	5.754	0.2906	5.933	0.2655	5.644	0.2922	5.858	0.2648
BFC (630nm)	2.435	0.0685	2.499	0.0328	2.486	0.0718	2.460	0.0374	2.415	0.0293	2.436	0.0692
GFC (417nm)	2.221	0.0268	2.198	0.0503	2.242	0.0255	2.200	0.0389	2.148	0.0283	2.137	0.0724
GFC (630nm)	1.885	0.0278	1.857	0.0488	1.904	0.0278	1.864	0.0388	1.804	0.0227	1.792	0.0733

Tables 6A and 6B: Absorbance at peak wavelength recorded when deionized water solutions containing 0.01 mg/mL ICG as MB, and 20 μL per 13 mL RFC, BFC and GFC, were exposed to white light for a period up to 12 weeks.

Chromophore	Concentrations Investigated				
ICG	0.1 mg/mL	0.25 mg/mL	0.5 mg/mL	0.75 mg/mL	1.0 mg/mL
MB	0.1 mg/mL	0.25 mg/mL	0.5 mg/mL	0.75 mg/mL	1.0 mg/mL
BFC (#1)	200 μL per 13 mL	400 μL per 13 mL	600 μL per 13 mL	800 μL per 13 mL	1000 μL per 13 mL
GFC (#5 & #1)	200 μL per 13 mL	400 μL per 13 mL	600 μL per 13 mL	800 μL per 13 mL	1000 μL per 13 mL

Table 7: Chromophore concentrations tested in chromophore-doped scaffold-enhanced solder.

Chromophore	Peak Absorption Wavelength (nm)	Laser System
ICG	805	5W 808nm
MB	665	400mW 670nm
BFC	630	35mW 632.8nm
GFC	417 and 630	35mW 632.8nm

Table 8: Chromophore absorption wavelengths and the lasers used to irradiate them in this study.

Set	Adhesive Specifications
Set A* (n=10)	25% BSA(w/v) □106 μm pore diameter
Set B* (n=10)	25% BSA(w/v) 106 - 150 μm pore diameter
Set C* (n=10)	50% BSA(w/v) □106 μm pore diameter
Set D* (n=10)	50% BSA(w/v) 106 - 150 μm pore diameter

*All sets used 0.5 mg/ml ICG, 85:15 PGLA, 70% wt. NaCl

Table 9: Adhesive fabrication parameters used in the study.

SPECIMEN #	GROUP A	GROUP B	GROUP C	GROUP D	NATIVE MUSCLE
1	2.5	3.6	3.0	3.6	4.1
2	2.3	3.7	3.8	5.7	6.2
3	2.6	4.3	2.9	4.7	4.9
4	2.7	3.8	2.5	4.5	5.5
5	2.4	3.2	2.7	4.2	4.9
6	2.5	3.9	2.6	4.1	4.9
7	2.5	4.0	2.6	4.7	5.5
8	2.3	3.3	3.4	3.5	4.3
9	2.2	3.4	2.9	3.7	4.3
10	2.7	3.6	3.0	3.6	3.9
MEAN (N)	2.5	3.7	2.9	4.2	4.8
STD DEV	0.17	0.33	0.41	0.69	0.72
% OF NATIVE TISSUE	51	76	61	88	100

Table 10: Maximum tensile strength (in Newton's) of scaffold-enhanced light-activated soldering of transected extraocular rectus muscle-to-extraocular rectus muscle according to adhesive and scaffold parameters outlined in Table 9.

SPECIMEN #	TENSILE STRENGTH (N)
1	2.8
2	2.7
3	3.0
4	2.9
5	2.5
6	2.9
7	3.4
8	3.6
9	2.9
10	2.8
11	2.8
12	2.3
13	2.5
14	2.8
15	2.2
16	2.8
17	2.7
18	3.3
19	3.2
20	3.6
Mean	2.9
St. Dev.	0.37

Table 11: Maximum tensile strength (in Newton's) of scaffold-enhanced light-activated soldering of sclera-to-sclera.

SPECIMEN #	TENSILE STRENGTH (N)
1	3.2
2	3.0
3	2.5
4	3.1
5	2.5
6	3.0
7	3.6
8	3.3
9	3.4
10	2.6
11	3.0
12	3.1
13	2.8
14	2.7
15	2.5
16	3.5
17	3.1
18	3.2
19	2.9
20	3.6
Mean	3.0
St. Dev.	0.36

Table 12: Maximum tensile strength (in Newton's) of scaffold-enhanced light-activated soldering of extraocular rectus muscle-to-sclera.

Example 4:

	Tensile Strength (N)		
Specimen	**Solder + PLGA**	**Solder + SIS**	**Solder Al ne**
1	1.4	1.7	0.4
2	2.3	1.4	0.8
3	2.0	2.3	0.6
4	1.4	1.9	1.2
5	1.6	2.2	1.8
6	2.1	1.5	0.9
7	2.0	1.7	1.3
8	1.7	1.6	0.7
Mean	1.8	1.8	1.0
St Dev	0.3	0.3	0.5

TABLE 13

Summarized data can be found in Fig. 10.

	Time-to-Failure (s)		
Specimen	**Solder + PLGA**	**Solder + SIS**	**Solder Alone**
1	164	159	37
2	265	122	96
3	224	271	75
4	149	220	116
5	154	236	197
6	209	137	85
7	184	168	102
8	118	175	68
Mean	183	186	97
St Dev	47	51	47

TABLE 14

Summarized data can be found in Fig. 11.

Example 5:

	Tensile Strength (N)			
Specimen	**Solder + PLGA**	**Solder + SIS**	**Solder Alone**	**Suture**
1	6.3	5.1	4.2	6.2
2	5.6	5.4	3.5	4.7
3	6.0	6.4	4.1	6.3
4	4.5	7.0	3.0	2.5
5	5.9	5.4	2.8	2.0
6	6.7	4.4	3.6	4.5
7	4.3	5.8	1.3	5.2
8	5.4	4.2	4.9	2.4
Mean	5.6	5.5	3.4	4.4
St Dev	0.8	0.9	1.1	1.7

TABLE 15

Summarized data can be found in Fig. 12.

	Time-to-Failure (s)			
Specimen	**Solder + PLGA**	**Solder + SIS**	**Solder Alone**	**Suture**
1	96	86	47	65
2	82	82	32	55
3	90	90	51	95
4	42	109	28	65
5	86	78	22	60
6	106	43	34	60
7	47	87	11	55
8	85	40	59	45
Mean	79	77	36	63
St Dev	23	24	16	14

TABLE 16

Summarized data can be found in Fig. 13.

Example 6:

	PLGA (irregular)		PLGA (smooth)		SIS (irregular)		SIS (smooth)		Solder Alone		Native	
Aorta	T (N)	t (s)	T (N)	t (s)	T (N)	t (s)	T (N)	t (s)	T (N)	t (s)	T (N)	t (s)
1	1.20	70	0.83	36	1.44	74	0.77	16	0.64	42	1.53	84
2	1.23	69	0.79	41	1.27	65	0.70	39	0.32	15	1.65	72
3	1.08	71	0.76	36	1.37	69	0.60	27	0.59	18	1.41	63
4	1.29	80	0.70	15	1.44	79	0.66	24	0.62	48	1.93	121
5	1.33	83	0.64	32	1.37	63	0.61	31	0.48	11	1.58	90
6	1.35	84	0.86	48	1.35	62	0.98	46	0.87	59	2.04	74
7	1.26	91	0.95	62	1.12	58	0.94	32	0.64	41	1.62	82
8	1.00	72	0.87	47	1.32	64	0.80	23	0.69	40	2.17	134
9	1.23	76	0.50	19	1.09	57	0.89	48	0.60	33	1.42	63
10	1.40	86	0.98	57	1.20	61	0.87	51	0.57	21	1.62	121
Mean	1.24	78	0.79	39	1.30	65	0.78	34	0.60	33	1.70	90
St Dev	0.12	8	0.15	15	0.12	7	0.14	12	0.14	16	0.26	26

	PLGA (irregular)		PLGA (smooth)		SIS (irregular)		SIS (smooth)		Solder Alone		Native	
Small Intestine	T (N)	t (s)	T (N)	t (s)	T (N)	t (s)	T (N)	t (s)	T (N)	t (s)	T (N)	t (s)
1	0.91	59	0.60	38	0.96	36	0.63	24	0.44	16	1.16	94
2	0.79	50	0.71	42	0.92	39	0.74	28	0.52	23	1.42	82
3	0.84	58	0.85	48	0.84	37	0.80	36	0.37	13	1.36	93
4	1.00	65	0.58	32	0.86	42	0.72	26	0.50	11	1.11	45
5	0.90	55	0.55	35	1.03	46	0.54	18	0.66	27	0.58	76
6	0.75	51	0.51	30	0.90	43	0.46	14	0.48	14	1.24	89
7	0.78	49	0.60	42	0.95	39	0.40	7	0.27	7	0.68	77
8	0.90	51	0.32	28	0.83	32	0.49	15	0.22	6	1.24	56
9	0.94	59	0.43	31	0.88	36	0.55	18	0.41	26	0.77	86
10	0.83	52	0.49	35	0.80	30	0.61	22	0.38	11	1.30	39
Mean	0.86	55	0.56	36	0.90	38	0.59	21	0.43	15	1.09	74
St Dev	0.08	5	0.15	6	0.07	5	0.13	8	0.13	8	0.30	20

	PLGA (irregular)		PLGA (smooth)		SIS (irregular)		SIS (smooth)		Solder Alone		Native	
Liver	T (N)	t (s)	T (N)	t (s)	T (N)	t (s)	T (N)	t (s)	T (N)	t (s)	T (N)	t (s)
1	0.32	50	0.29	29	0.32	41	0.20	8	0.05	3	1.24	70
2	0.42	54	0.11	23	0.36	42	0.18	28	0.16	16	1.27	54
3	0.44	50	0.22	26	0.30	42	0.33	39	0.08	6	1.14	44
4	0.25	37	0.19	31	0.41	46	0.15	8	0.09	8	1.45	64
5	0.26	35	0.14	16	0.32	35	0.27	12	0.18	15	1.48	85
6	0.30	51	0.29	30	0.43	45	0.24	14	0.23	31	1.42	43
7	0.41	53	0.33	49	0.27	32	0.22	29	0.19	21	1.30	68
8	0.30	41	0.36	41	0.31	36	0.38	45	0.26	42	1.28	37
9	0.27	40	0.28	36	0.24	29	0.11	17	0.11	28	1.21	47
10	0.35	49	0.17	32	0.20	23	0.24	34	0.12	25	1.43	72
Mean	0.33	46	0.24	31	0.32	37	0.23	23	0.15	20	1.32	58
St Dev	0.07	7	0.08	9	0.07	7	0.08	13	0.07	12	0.12	16

	PLGA (irregular)		PLGA (smooth)		SIS (irregular)		SIS (smooth)		Solder Alone		Native	
Spleen	T (N)	t (s)	T (N)	t (s)	T (N)	t (s)	T (N)	t (s)	T (N)	t (s)	T (N)	t (s)
1	0.72	61	0.43	35	0.63	52	0.41	31	0.26	16	0.90	58
2	0.57	52	0.63	61	0.59	49	0.47	33	0.21	14	1.18	70
3	0.62	60	0.57	48	0.65	55	0.53	42	0.36	27	1.52	83
4	0.65	61	0.51	40	0.60	53	0.57	44	0.43	31	0.97	45
5	0.69	68	0.79	49	0.62	57	0.51	41	0.32	24	1.46	77
6	0.61	52	0.46	37	0.74	58	0.44	22	0.48	36	1.06	49
7	0.63	54	0.41	34	0.69	42	0.46	17	0.51	32	1.04	63
8	0.70	62	0.48	32	0.72	57	0.50	33	0.32	18	0.69	60
9	0.68	59	0.40	23	0.59	40	0.55	45	0.26	12	1.33	67
10	0.64	55	0.38	27	0.65	48	0.56	39	0.24	14	0.84	41
Mean	0.65	58	0.51	39	0.65	51	0.50	35	0.34	22	1.10	61
St Dev	0.05	5	0.13	11	0.05	6	0.05	9	0.10	9	0.27	14

	PLGA (irregular)		PLGA (smooth)		SIS (irregular)		SIS (smooth)		Solder Alone		Native	
Lung	T (N)	t (s)	T (N)	t (s)	T (N)	t (s)	T (N)	t (s)	T (N)	t (s)	T (N)	t (s)
1	0.25	15	0.17	13	0.19	25	0.19	12	0.12	22	0.57	43
2	0.21	24	0.11	3	0.36	37	0.10	5	0.05	2	0.66	52
3	0.37	27	0.21	17	0.23	18	0.31	32	0.08	5	0.56	38
4	0.23	32	0.25	22	0.29	22	0.17	9	0.06	6	0.65	48
5	0.31	12	0.12	5	0.21	14	0.25	17	0.24	24	0.68	45
6	0.20	20	0.25	17	0.20	13	0.09	3	0.11	7	0.63	36
7	0.18	19	0.27	32	0.24	16	0.12	4	0.18	11	0.54	46
8	0.27	17	0.10	4	0.32	24	0.21	12	0.17	9	0.43	32
9	0.25	21	0.19	10	0.28	20	0.19	16	0.32	31	0.51	46
10	0.24	26	0.21	21	0.24	12	0.18	21	0.05	3	0.72	52
Mean	0.25	21	0.19	14	0.26	20	0.18	13	0.14	12	0.60	44
St Dev	0.06	6	0.06	9	0.06	7	0.07	9	0.09	10	0.09	7

TABLE 17

Summarized data can be found in Figs. 16 and 17.